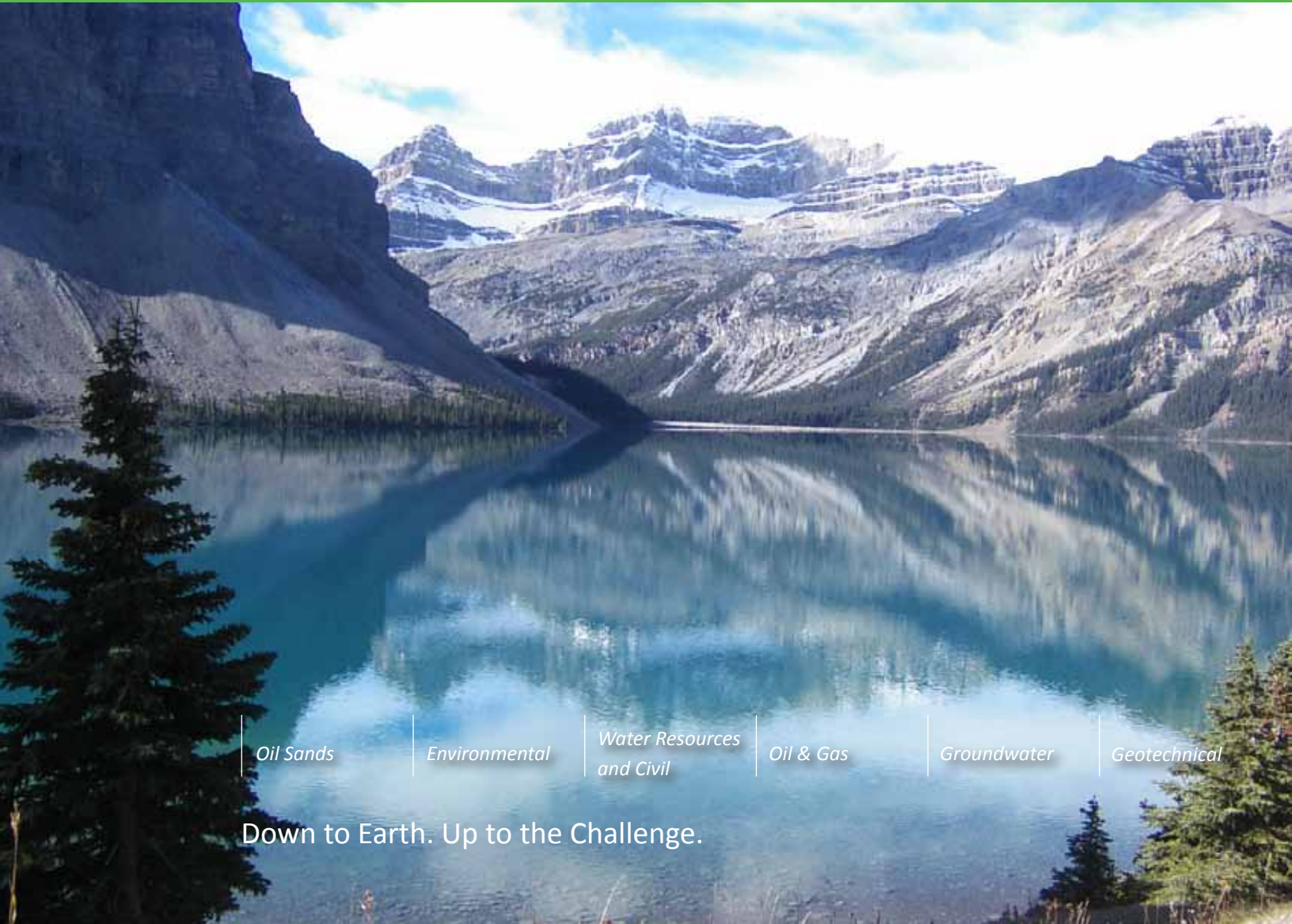




Dedicated engineering and environmental services

We are dedicated to achieving client satisfaction and providing high-quality service.

ALBERTA SERVICES



Oil Sands

Environmental

*Water Resources
and Civil*

Oil & Gas

Groundwater

Geotechnical

Down to Earth. Up to the Challenge.

About us

Klohn Crippen Berger Ltd. (KCB) is an international engineering and environmental consulting firm with its head office in Vancouver and seven offices in strategic locations in Canada, Peru and Australia. We have a strong reputation for quality service and technical expertise in a range of services including: Mining, Environmental, Water, Power, Transportation, and Oil and Gas. Since forming in 1951, we have a long history of participation in local projects, as well as a strong international reputation. We are working on some of the largest, most challenging engineering projects, both nationally and internationally.

"In business for 58 years, its [KCB's] quality of engineering gives it a stellar reputation."

National Post. 2nd Feb, 2009.

Team leaders



Brian Rogers Vice President, has more than 30 years of experience in the design and construction of diverse civil resource development and water resources projects. His experience includes the design and construction of dams, irrigation projects, transportation and infrastructure projects, tailings dams and mine waste rock disposal schemes, and arctic offshore hydrocarbon development projects.

Chris Langton has over 20 years of groundwater project experience in the mining, industrial and commercial infrastructure sectors. Chris has experience in mine water balance studies, mine dewatering, tailings and waste rock dump water budgets and mine closure plans. He has completed contamination assessments, remediation and monitoring of oil and gas facilities, municipal and toxic industrial waste facilities. Chris has led regional groundwater assessments for groundwater

supply developments and for water resource management plans.

Gregg O'Neil has over 30 years of experience in civil engineering design and project management with a focus on the mining and pipeline industries.

His mining experience includes the design, monitoring and construction supervision of large tailings dykes and waste dumps, as well as the design and monitoring of pit walls. Gregg's pipeline experience includes route selection and design of numerous pipeline river crossings.

David Mack is a Senior Hydraulic and Structural Design Engineer who has over 28 years of experience in the civil, hydraulic, and structural engineering disciplines. He has been involved in a number of major dam, reservoir and irrigation projects primarily in Alberta.

David's experience encompasses the total project; from concept development to detailed design, tendering and construction.

Tom Murray has over 30 years of experience in geotechnical engineering, including project management, geotechnical design, contract preparation and construction supervision. He has extensive experience in foundation

engineering, dam safety, oil sands and water resources projects.

Bill Chin has over 30 years of experience in geotechnical engineering, including project management, site investigation, design, construction, operations, performance monitoring and safety evaluations of major earthfill dams for both tailings and water storage, as well as for foundations of large industrial buildings. His geotechnical practice extends over several industry sectors, including oil sands, mining, water resources, hydroelectric and pulp and paper.

Brett Stephens is a Senior Geotechnical Engineer with over 20 years of experience in geotechnical and environmental engineering, including water supply and tailings dams, highway projects, bridges, buildings, landslip remediation and large scale earthworks.

Mark Polet is a biologist who has worked more than 30 years in the environmental discipline. His experience extends through environmental impact assessments, habitat restoration and reclamation, biological and biophysical assessments, waste management, environmental ethics and public enrolment.





Alberta Group

From our offices in Calgary, Edmonton, Lloydminster and Inuvik, KCB's Alberta Group works on challenging projects in the oil sands developments, onshore and offshore oil and gas industry, traditional mining, infrastructure and water resources markets. Our projects include all aspects of tailings management, dam designs, pipelines, offshore drilling islands, plant site foundation engineering, hydrogeology, hydrotechnical, environmental and reclamation services.



PSMJ Resources Inc.



Our Values

- People first
- Ethics, integrity, honesty
- Professionalism
- Innovation
- Quality
- Technical excellence
- Recognition of individual contributions
- Teamwork
- Sustainability
- A satisfying and fun workplace

Our Vision

Excellence, teamwork, and innovation building a better world.

Our Mission

To attract, develop, and retain talented staff and quality clients who thrive and excel as a team while undertaking exciting projects.



Geotechnical

INTEGRATED SOIL ENGINEERING AND DESIGN

Services

Klohn Crippen Berger has provided geotechnical services to the mining, power, energy, water resources and transportation sectors for over 55 years. Our team of engineers and geoscientists have a broad range of analytical, design and construction experience on a variety of projects in Canada and abroad.

Foundation Engineering: We have provided foundation engineering for a broad range of projects and soil conditions. KCB has designed foundations for pulp and paper mills, refinery sites, oil sands plants, offshore structures, mine facilities, cogeneration facilities, sewage treatment plants, buildings and industrial structures.

Embankment Engineering: Embankment design, slope stability assessments, seepage and settlement analyses, reservoir stability assessments, dam safety studies, construction management and inspections.

Earthquake Engineering: KCB has carried out regional assessments of seismic hazards. We can provide designs for slope stabilization works and foundations in high hazard seismic areas taking into consideration dynamic stability and deformation performance.

Site Investigations, Instrumentation, and Monitoring: KCB has completed thousands of site investigations for geotechnical and environmental engineering projects involving soil sampling, rock coring and groundwater monitoring. KCB has installed and monitored various types of instruments including slope indicators, geotechnical gauges, pressure sensors, and survey monuments.

Construction Support: Our field assignments have involved the construction management and inspection of bridges, pulp mills, dams, canals and hydraulic structures.

Laboratory Testing: Our laboratory can perform standard soils testing including moisture content, grain size, permeability, Atterberg limits, specific gravity / relative densities, standard Proctor compaction tests / modified Proctor tests, direct shear tests, triaxial and consolidation tests.





Experience

McGregor Dam Reservoir Structures:

McGregor Reservoir has a live storage of 359 million m³. The project consisted of upgrading the existing two dams, providing a spillway for handling the PMF, replacing the irrigation outlet and reservoir inlet structures and assessing potential for hydropower development. Geotechnical issues involved stability assessment of the dams and abutment slopes on weak bentonite foundations, seepage analysis and settlement, cofferdamming, excavation, dewatering and foundation instrumentation. KCB conducted the hydraulic and structural designs, prepared design memoranda and tender documents, provided quality assurance and construction management.

External Tailings Facility (ETF) Geotechnical Review and Expansion Design:

Shell Canada Energy's Albion Sands Muskeg River Mine ETF is the tailings storage facility at the mine which will be used during the initial six years of mine operation. The ETF

design evolved due to changes in operating conditions, availability of construction materials, dyke performance and the need for additional tailings storage.

Geotechnical assessments were conducted to evaluate the dyke performance and to recommend design modifications to store the required tailings volumes.

The assessments focused on the pore pressure response of the dyke fill and weak foundation clays to loading, stability of the dyke segments founded on weak clay layers, deformation in the muskeg underlying portions of the dyke and potential susceptibility of the tailings sand to static or dynamic liquefaction. Further investigation of tailings properties, to assess performance for possible expansion scenarios, is ongoing.

Another project involved the expansion design of a 60 m high ETF and a 75 m high in-pit tailings dyke. KCB conducted detailed design of an instrumentation program for

tailings impoundment and the design of a permeable dyke to protect the recycle water barge.

Major Dams Seismic Hazard Assessment:

Seismic hazard assessments were performed on 14 major dams throughout Alberta.

Ground motions, including Peak Ground Acceleration, Peak Ground Velocity and spectral accelerations were calculated for the dam sites. These dams were classified as "High-Very High" consequence dams; therefore, each dam must be able to accommodate seismic ground motions resulting from earthquakes with a 10 000 year return period without uncontrolled releases of the reservoir.

The objective was to provide probabilistic-based ground motions that were derived using consistent methodology and using the latest seismicity information.





Oil Sands Services

Klohn Crippen Berger is a market leader in providing multi-disciplinary engineering services to the oil sands industry. Our services incorporate the management, protection and responsible use of our important natural resources throughout the entire facility life cycle of design, construction, operation and closure.

Engineering Design: We have a progressive group of professionals who deliver cost-effective, innovative designs to support oil sands project development and oil sands mining operations. We understand the regulatory process very well and have consistently produced designs approved by regulators with a minimum of conditions. We can do the same for you!

Mine Environmental Management: Our team is well-positioned and committed to ensuring your projects meet regulatory

standards for environmental management. Environmental considerations are incorporated into the design, development and operational phases for all our clients.

Waste Management: KCB is a leader in the design and construction management of some of the world's largest tailings and overburden storage facilities. This has required us to be innovative in helping oil sands developers and producers create waste management programs that are safe, cost-effective and minimize environmental impact. No project is too large or too complex.

Mine Water Management: KCB can successfully address mine water management issues during all phases of mine development including operation and closure. Our team realizes how crucial management of surface and groundwater is to maintaining operations and meeting environmental objectives.

Project Management: KCB realizes that excellent project management, addressing scope, quality, time and budget is essential to a successful project. Your project goals and objectives can be met through our efficient allocation of resources.

*"It was clear
that your team's
extraordinary
efforts stood out
among the others."*

*Richard L. George,
Suncor Energy*



Experience

Muskeg River Mine External Tailings Facility (ETF) Expansion

The Muskeg River Mine, operated by Shell Canada Energy, was increasing production and required additional tailings storage space in the ETF.

The ETF expansion doubled capacity by enlarging the perimeter and by raising the dykes. The design addressed weak foundation clays, loose tailings deposits and perimeter constraints, including pipe and power lines, roads, environmental limits and pit limits.

Jackpine Mine Expansion External Tailings (ETF) Facility

KCB completed a feasibility study and detailed designs of the Jackpine Mine ETF for Shell Canada. The ETF is situated on a buried meltwater channel system and on a weak foundation. The design considered dyke stability and seepage issues. Surface water management included design of a temporary sedimentation pond and closed-circuit perimeter collection system. KCB provided engineering construction supervision for the starter dyke and related facilities.

North Steepbank Mine Extension: The Suncor North Steepbank Mine Extension is a new mine located on the east side of the Steepbank River. KCB provided geotechnical design and construction support services. KCB designed the road embankments and bridge foundations for the haul road that crosses the Steepbank river valley. A stabilizing toe buttress was designed to support the adjacent North In-Pit Dump along the west escarpment excavation. KCB also provided construction drawings and full-time construction support.

In the preliminary stages of mine development, Suncor required a temporary external waste dump for the storage of the pre-stripped overburden. KCB provided the geotechnical design and a construction drawing package for the waste dump. The construction drawing package provided construction recommendations and an instrumentation monitoring program.

Suncor South Tailings Pond Detailed Design

KCB provided the design for a major External Tailings Facility at Suncor's oil sands mine. Design components included external tailings dykes, seepage control, groundwater and surface water management, and associated pumping stations.

Starter dyke engineering construction support was provided along with construction inspection, borrow source identification and development and provision of all construction drawings and specifications.

Fort Hills Oil Sands: KCB designed the Out-of-Pit Tailings Area (OPTA) that provides storage and waste over-burden for the Petro-Canada Oil Sands Fort Hills project near Fort McMurray, Alberta.

The OPTA is founded on a large, fine-grained sand deposit and on a weak foundation. A design challenge was preventing the mitigation of seepage from the OPTA to the surrounding environment. A system of interception wells was designed to capture this seepage and return it to the OPTA.



Environmental Services

Klohn Crippen Berger (KCB) offers sustainable, cost-effective environmental services. We have extensive experience in Northern and Western Canada and have successfully completed projects in the oil and gas, mining, infrastructure and water resource industries. As a multi-disciplinary consulting firm, KCB can integrate disciplines to meet your project requirements.

Environmental Assessments: Investigations have been conducted on commercial, industrial, mining, agricultural, and oil and gas facilities throughout Alberta, Saskatchewan and the Arctic for development, divestiture, pre-acquisition, liability or reclamation purposes. KCB can assess baseline conditions and impacts to habitat soil, surface water, groundwater, air and sediments using both intrusive and non-intrusive methods.

Remediation and Monitoring: We have successfully remediated and monitored environmental impacts identified during environmental assessments. Site specific remedial options involving modeling, design, in-situ/ex-situ remediation strategies and risk assessments may be developed. We are familiar with compliance monitoring designs and monitoring designs for operational performance.

Reclamation: We have successfully reclaimed sites utilizing current reclamation methods to achieve the desired end land use. Our team has the capability to complete detailed site assessments, reclamation plans, surface contouring, re-vegetation, weed management and reclamation applications to regulators for site closure.

Permitting and Regulatory Compliance:

KCB works closely with government, communities and industries to develop successful solutions for environmental, social and resource requirements, and complete regulatory permitting and compliance reporting.

Environmental Systems

Development: KCB has developed environmental management systems for bedding management, greenhouse gas management, pollution prevention, waste systems development and groundwell geothermal development.





Experience

Phase I, II, III Environmental Site Assessments and Reclamation Projects:

Investigated and managed Phase I and II environmental site assessments, remediation, surface reclamation, detailed site assessments and reclamation applications of oil and gas facilities to obtain site closures on private, public and aboriginal lands.

Indian Oil & Gas Environmental Audit and Liability Assessment: Investigated and identified non-compliance issues with federal and provincial legislation, industry guidelines, and good operating practices. Identified potential contaminant sources and receptors, and provided cost estimates associated with environmental liabilities.

Liability Assessments: KCB has completed liability assessments for the oil and gas industry for remediation and / or reclamation of oil and gas facilities.

Suncor Steepbank Groundwater Monitoring: KCB is conducting groundwater monitoring for Suncor's Steepbank Mines

north of Fort McMurray, Alberta. The plan includes sampling of the current monitoring networks and the development of alternative monitoring strategies.

ISR DEW Line Landfill Monitoring, Defence Construction Canada, Indian And Northern Affairs Canada: KCB conducted geotechnical, soil and groundwater monitoring at seven remediated former DEW Line Stations in the western arctic.

Killam Abandoned Gas Plant: KCB designed and implemented a groundwater monitoring program, conducted an intrusive soil and groundwater sampling program to delineate on and off-lease soil impacts, developed a comprehensive remediation plan to reduce social and environmental risks to the surrounding area and satisfy terms and conditions of the Environmental Protection and Enhancement Act operating approval. KCB remediated soil on-site using ex-situ remediation strategies.

Pipeline Leak of Condensate into Soil and Fractured Rock Impacting Groundwater

in a Domestic Use Aquifer: A groundwater remediation and risk management program was implemented. A multi-phase extraction system was designed and installed at site to capture and remove free-phase, dissolved-phase and vapour-phase hydrocarbon constituents from the saturated and unsaturated zones.

Sheep Creek Fuel Spill Delineation and Remediation: KCB delineated, excavated and remediated soil on-site in a remote and environmentally sensitive area of Ivvavik National Park, Yukon.

Soil Monitoring for Sour Gas Plants: Designed soil monitoring proposals, implemented soil monitoring and management programs at sour gas plants in Alberta as part of ERCB directives.

Former Drilling Sump Assessment: Completed over 50 site assessments in the Mackenzie Delta. These included soil, surface water, permafrost and geophysical data collection.





Water Resources and Civil Services

Klohn Crippen Berger delivers a complete range of engineering services that enable us to take your projects from conception through to operation. These services include feasibility studies, detailed designs, field investigations and monitoring, contracting, construction administration and inspections, commissioning, site impact assessments and regulatory approvals submissions and support.

Hydrology and Hydraulics: Water balance modeling to evaluate available supply and storage needs. Hydrologic studies for assessing the potential for flooding and the need for flood mitigation works, environmental impacts and viability for hydropower development. Hydraulic and hydrodynamic modeling for designing river crossings, fish passage facilities, streambank stabilization measures and erosion protection works.

Water Storage and Conveyance (Dams and Hydraulic Structures): Rehabilitation and development of new and existing dams, reservoirs and appurtenant structures, river diversion works, irrigation canal and pipeline systems, and water control and conveyance structures.

Mine Surface Water Management: Site drainage systems, including stream diversion works, drainage ditches and related structures, haul road crossings, storage and sedimentation ponds, decant structures, pump stations, and level and flow measurement facilities.

Stormwater Management: Stormwater modeling and design of pipeline systems, retention and treatment ponds, wet and dry ponds, underground storage facilities and hydraulic structures.

Flood Inundation and Protection: Flood routing and dam breach simulations, inundation mapping and emergency preparedness planning. Flood protection works, including dykes and flood walls.

Streamflow and Climate Monitoring: Designing, installing, monitoring and maintaining streamflow monitoring and weather stations, including real-time communication systems in remote locations, to capture data needed to complete environmental studies and acquire regulatory approvals.



Experience

Glenmore Dam Penstock Rehabilitation:

Refurbishment of two 3.6 m diameter penstocks and butterfly valves (circa 1930s) at Glenmore Dam. Completed detailed design of new head gates for the penstocks and refurbishment work and provided construction inspection.

McGregor Reservoir Structures:

The reservoir, created by two earth dams (circa 1914), has a live storage of 358 million m³ and a flooded area of 5300 ha. Rehabilitation work included raising and upgrading dams and spillway facilities to handle the PMF and replacement of the irrigation outlet structure. One significant challenge was to provide cofferdams and control structures which permit adequate water storage while also allowing reservoir lowering for construction.

East Fish Creek Stormwater Quality

Retrofit: The project included converting an abandoned gravel pit within Fish Creek Provincial Park, Alberta into a wetland system to treat stormwater that was

originally released directly into the Bow River. KCB identified areas where significant reductions, versus earlier estimates (by others), in stormwater discharge would result, and developed a new concept that avoided excavations along the existing hillside. This concept was adopted for implementation by the client.

Calgary Bow River Weir: The Calgary Weir, located just 3 km east of downtown Calgary, is used to divert water from the Bow River into the Western Irrigation District. Flow over the weir creates an extreme drowning hazard that has claimed several lives and inhibits fish passage. The project includes modifying the weir and incorporating a series of drop structures, pools and channels, to enable passage for fish and boats.

52nd Street SE Road Widening: As part of The City of Calgary's 52nd Street Road Widening Project, KCB was responsible for extending and relocating existing utilities, and providing new stormwater drainage

systems, including wetland and dry ponds. The nature and complexity of the project meant that the design team had to be ready to adapt to ongoing changes to the road design, actual site conditions and land issues.

Regional Aquatic Monitoring Program

(RAMP): Operation and monitoring of a network of approximately 25 hydrometric and climate stations to assess the health of rivers and lakes in the oil sands region of northeastern Alberta. Data collected was analyzed, reported and provided as mandated by regulatory approvals.

Waterton to St. Mary Main Canal

Rehabilitation: The conceptual study included developing a comprehensive flood handling strategy, condition assessment of the diversion, conveyance and wasteway structures, identifying rehabilitation requirements along with a construction implementation strategy.



Oil and Gas Services

Klohn Crippen Berger delivers geotechnical, hydrological and environmental services to the oil and gas industry throughout Western Canada. Our services incorporate the management, protection and responsible use of our important natural resources throughout the entire facility life cycles of exploration, design, construction, operation and closure.

Pipeline Design and Maintenance: We have helped numerous operators and pipeline owners with both geotechnical design and maintenance. We have assisted designers with pipeline routing (including geohazard identification and mitigation), river crossing designs, buoyancy control designs and ROW drainage and erosion control designs. Our maintenance experience includes slope stabilization, drainage control, river crossing stabilization and ROW erosion control measures.

Horizontal Directional Drilling Design (HDD): KCB provides complete turnkey services to companies and contractors planning HDD crossings. Let Klohn Crippen Berger successfully organize and execute your field programs and provide you with critical advice on the optimal alignments for trenchless pipeline construction.

Facilities Design and Maintenance: KCB can assist with facility and wellsite related projects, from preliminary site location and investigation stages, through construction and operation stages, to abandonment. KCB provides civil engineering design for earthworks and foundations involving various types of bearing configurations from lightly loaded slabs to rock-socketed caissons in bedrock. Our projects have involved terrain and maintenance issues such as slope stabilization, site drainage and road rehabilitation.

River Engineering: From design, to operations, to abandonment, the river engineering group in KCB supports pipeline owners with outstanding value. We advise on pipeline routing at river crossings with assessments of vertical and lateral scour, to ensure minimum maintenance over the pipeline life. Our river design work spans the range of pipeline sizes and river complexities and provides crossing designs that minimizes future risk at the lowest cost.

Our river engineering services are in high demand in the pipeline operations phase. We specialize in depth of cover surveys and remediation and in bank erosion repair designs. Our clients also call on us for the complete suite of inspection services during construction of stream crossing repairs.





Experience

Geotechnical Evaluations of Oil and Gas Facility Developments

- Access Pipeline - Sturgeon Terminal near Red Water, Alberta
- Encana Corporation - Compressor facility near Big Valley, Alberta
- Cadence Energy - Oil battery and compressor facility near Valleyview, Alberta
- Access Pipeline - Trico meter station
- Access Pipeline - Cristina Lake, north of Conklin, Alberta
- Husky Energy - Moose Mountain oil and compressor facility near Calgary, Alberta

The scope of geotechnical services included foundation design of pumps and compressor building foundation granular oil tank bases, communication towers, site drainage and civil earthwork grading, site reconnaissance / terrain assessment of site condition, planning and execution of geotechnical field drilling programs, provision of foundation design parameters for driven piles, rock-grouted caissons, concrete spread footings, mat foundation and site construction inspection and road culvert hydrological assessment.

Geotechnical Evaluations of Horizontal Directionally Drilled (HDD) Stream Crossings

- Petro-Canada - Prentic Creek near Rocky Mountain House, Alberta
- Enermark Energy - Battle River near Wainwright, Alberta
- Suncor Energy - Pine Creek northwest of Edson, Alberta
- Tusk Energy - Temple Creek northwest of Fort St. John, British Columbia
- Penn West Energy - Souris River, near Melita, Manitoba
- Access Pipeline - Trico lateral pipeline near Fort Saskatchewan, Alberta

Trenchless technology was proposed to construct the pipeline stream crossings. The scope of geotechnical evaluations included: liaison with EPC engineering and construction management teams to assist with the design of the HDD stream crossing, aerial and ground-based site reconnaissance, terrain / slope stability assessment and aerial photo interpretation, planning and execution of geotechnical borehole drilling programs, provision of data for use in design of the HDD crossing, preparation of construction drawings and technical HDD evaluation reports.

Wellsite Geotechnical Terrain Assessments

- Suncor Energy - Wellsite developments in the Alberta Foothills and Rocky Mountain Front Ranges.
- CNRL - Geotechnical terrain assessments for wellsite and road developments.

Salmo Gas Pipeline, Erosion Protection,

Salmo, BC: KCB's scope of work included preliminary design, regulatory permitting, detailed design and construction monitoring of the erosion protection works.

River Engineering

- Nordegg River Diversion and Crossing Replacement
- Site Investigations for crossing designs of the South Saskatchewan and Red Deer Rivers on the Express Pipeline Project
- Site inspections, EM pipe scoping, flood analyses and channel stability assessments for numerous major rivers in Western Canada
- Battle River Erosion Protection Measures
- Pipeline Scour Database Development and Maintenance
- Pipeline Rupture Investigations





Groundwater Services

Klobn Crippen Berger has a strong groundwater team. Our groundwater staff have strong practical, field-based experience and numerical modeling skills required to analyze complex geological and hydrogeological environments, and provide sound groundwater engineering designs.

Baseline Studies: A representative groundwater baseline is fundamental to project development as groundwater is frequently a pathway for contamination. KCB has completed several baseline groundwater studies for major resource development projects.

Groundwater Assessments: Our recent groundwater assessments have ranged from multi-million dollar site investigations for large mining developments, to detailed assessments for dewatering designs for

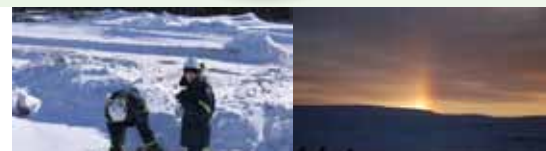
infrastructure developments in complex hydrogeological environments. Groundwater contamination assessments are routinely completed for oil and gas and other facilities.

Groundwater Flow Modeling: KCB is recognized by clients as a leader in groundwater modeling. Industry standard groundwater modeling software platforms FEFLOW and MODFLOW are used, and our modellers have developed tools that streamline the modeling process and improve model predictive functionality.

Groundwater Engineering: Some recent solutions delivered by our team include: seepage mitigation designs for tailings facilities, mine depressurization and dewatering designs and interception designs to engineer aquifer flow for seepage management.

Regulatory Compliance: KCB has a proven track record of working closely with government, First Nations, communities and industries to develop and implement successful groundwater solutions and monitoring plans for system performance monitoring and compliance reporting.

*Challenge
us to take on
your toughest
projects*



Experience

Travers Inlet Structures, Alberta

Infrastructure: A dewatering system was designed for construction of a new canal inlet into the Travers Reservoir in Southern Alberta. To construct the inlet, an excavation immediately adjacent to the Travers Reservoir was successfully dewatered using two stages of wellpoints. Construction was completed on schedule.

Mine Dewatering Ekati Fox Pit: A mine dewatering design was provided for the Koala underground mine in the Northwest Territories. The design was based on hydraulic testing of faults and fractures using inclined piezometer completions installed from underground mine openings. Fracture flow groundwater modeling provided inflow predictions for mine development and operating scenarios.

Fort Hills Mine Baseline Study: A baseline hydrogeological study was completed for Petro-Canada Oil Sands Inc. at the Fort Hills project north of Fort McMurray, Alberta. Aquifer characterization was addressed

for regional and local aquifers and for groundwater-surface water interactions with local lakes and rivers.

Site C Hydroelectric Impact Assessment:

We constructed 3D geological and groundwater models for BC Hydro to assess the likely extent and impact of increased groundwater levels that may result from construction of a dam.

Muskeg River Mine, Shell Canada Energy:

Aquifer depressurization is required in advance of mining to provide safe, dry working conditions in the open-pit mine near Fort McMurray, Alberta. The existing system was assessed and a revised design was approved to improve depressurization of future mining areas.

Jackpine External Tailings Facility, Shell Canada Energy:

A seepage mitigation design was completed for a tailings facility to manage seepage for environmental compliance and to achieve geotechnical foundation depressurization criteria for stability.

Suncor Millennium Mine Operations

Support: Since 1992, We have provided groundwater support to Suncor Energy. Services have included annual monitoring compliance reports, baseline groundwater studies, design and installation of compliance and performance monitoring well systems, depressurization assessments and well designs, and coordination of geophysical assessments for hydrogeological interpretations. We have also designed and supervised the installation and commissioning of a 10 000 m³/day seepage control wellfield for the South Tailings Pond.

Hangingsstone SAGD Groundwater Support:

Groundwater services at the Japan Canada Oil Sands Limited (JACOS) trial SAGD facility have included annual groundwater sampling and reporting, compliance site assessment services and monitoring well installations.





Through our association with the Louis Berger Group, Inc., a leading infrastructure engineering, environmental science, and economic development consultant we have access to over 100 offices worldwide, and a breadth of technical expertise.

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